

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: JEONG, Seung Hoon

SERIAL NO.: 10/575,351

ART UNIT: 1797

FILED: April 11, 2006

EXAMINER: Savage, M. O.

TITLE: AUTO-REGENERABLE HOT AND COLD WATER SOFTENER

Amendment A: CLAIM AMENDMENTS

Claims 1 - 14 (canceled).

15. (new) An automatic regenerable cold/hot water softener apparatus comprising:

    a water softening tank including at least two softening water regions formed along the vertical direction of a length of said water softening tank so as to partition radially an inside of a cylindrical body, the water softening regions being filled with an ion exchange resin, said water softening tank having a valve region formed in an upper end thereof so as to join the water softening regions to each other, said water softening tank having a water outlet region formed in a lower end thereof so as to join the water softening regions;

    a regenerating tank filled with a regenerating substance, said regenerating tank having a regenerating tank stopper suitable for opening an inside thereof;

    a raw water supply pipe connected to said valve region so as to supply raw water to said valve region;

    a regenerating raw water pipe and a regenerating water pipe connected to an upper side of a lower end of the regenerating tank;

    a direct water pipe connected to said valve region and to said water outlet region;

    a temperature sensor means cooperative with said raw water supply pipe, said

temperature sensor means for sensing temperature of the raw water;

a flow meter means for finding the cumulative total of the supply amount of the raw water, said flow meter means cooperative with said raw water supply pipe;

a switching valve means positioned in said valve region for supplying raw water to one of the water softening regions in a water softening mode, said switching valve means for inducing raw water into said regenerating raw water pipe and then supplying regenerating water collected from said regenerating water pipe to each of the water softening regions in a regeneration mode, said switching valve means for inducing raw water into said direct water pipe in a direct water mode, said switching valve means for shutting off said raw water supply pipe in an intermittent mode;

a valve driving means cooperative with said switching valve means for controlling an operation of said switching valve means; and

a controlling means for distributing the raw water into each of the water softening regions according to a temperature in the water softening mode based on a measured result of the temperature sensor means, said controlling means for controlling the valve driving means so as to change the intermittent mode into the regeneration mode based on the cumulative total of the flow meter means.

16. (new) The apparatus of Claim 15, further comprising:

a pre-processing filter installed in said raw water supply pipe so as to filter the raw water.

17. (new) The apparatus of Claim 15, further comprising:

a pre-processing filter installed in said raw water pipe so as to absorb the raw water, said pre-processing filter having activated carbon therein.

18. (new) The apparatus of Claim 15, said switching valve means comprising:

a static disk fixed to close an upper end of each of the water softening regions, said static disk suitable for exposing soft water holes and for regenerating water distribution holes communicating with the water softening regions, said regenerating raw water pipe having a regenerating raw water hole communicating therewith, said direct water pipe having a direct water hole communicating therewith; and

a rotary disk staked on the static disk, said rotary disk rotatable about a center axis projected upwardly, said rotary disk being rotatable to a first position so as to have a connecting opening exposing one of the soft water holes to the valve region in the water softening mode, said rotatable disk being rotatable to a second position so as to expose said regenerating raw water hole to the valve region and interconnecting said regenerating water hole and said regenerating water distribution holes by a trap groove in the regeneration mode, said rotatable disk being rotatable to a third position so as to expose said direct water hole to said valve region in the direct water mode, said rotatable disk being rotatable to a fourth position so as to expose said closed hole to said valve region in the intermittent mode.

19. (new) The apparatus of Claim 18, wherein said regenerating water hole is positioned eccentrically from a center of said static disk, said regenerating water distribution holes being arranged along edges of said regenerating water hole, each of said soft water holes and said direct water hole and said regenerating raw water hole and said closed hole being arranged radially in turn along said edges of said static disk and being maintained at equal distances from a center of said static disk.

20. (new) The apparatus of Claim 15, wherein said raw water supply pipe is connected to a side of said valve region, said regenerating water pipe extending from a lower end of the regenerating tank and passed through a side of a lower end of the regenerating tank and connected to a rear surface of said static disk, said direct water pipe extending from said rear surface of the static disk and connected to said water outlet region.

21. (new) The apparatus of Claim 15, further comprising:

an enlarged groove at an upper end of the soft water holes adjacent to adjacent soft water holes.

22. (new) The apparatus of Claim 15, said wherein the valve driving means comprises:

a rotation shaft;

a motor gear fixed to said rotation shaft, said motor gear having a center penetrated by said rotation shaft;

a main gear engaged with said motor gear, said main gear having a center penetrated and fixed by a center axis of said rotary disk; and

a position plate having a plurality of discrimination marks along an edge thereof, said position plate having a center penetrated by said center axis of said rotary disk.

23. (new) The apparatus of Claim 18, said controlling means comprising:

a position detecting sensor means cooperative with said rotary disk for finding the degree of rotation of the rotary disk; and

a logical operation means cooperative with said valve driving means for controlling rotating direction and an angle of a rotation shaft of said valve driving means based on said position sensing means, said temperature sensing means and said flow meter means.

24. (new) The apparatus of Claim 15, further comprising:

a water level detecting sensor means positioned in said regenerating tank for sensing a level of the regenerating water within said regenerating tank; and

a discharging valve extending through a bottom surface of said regenerating tank, said discharging valve being openable and closable by the water lever detecting sensor means so as to constantly maintain a level of the regenerating water in said regenerating tank.